



Rwanda Water and Forestry Authority

Flood Management and Early Warning System in Sebeya Catchment

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PRESENTATION OUTLINE

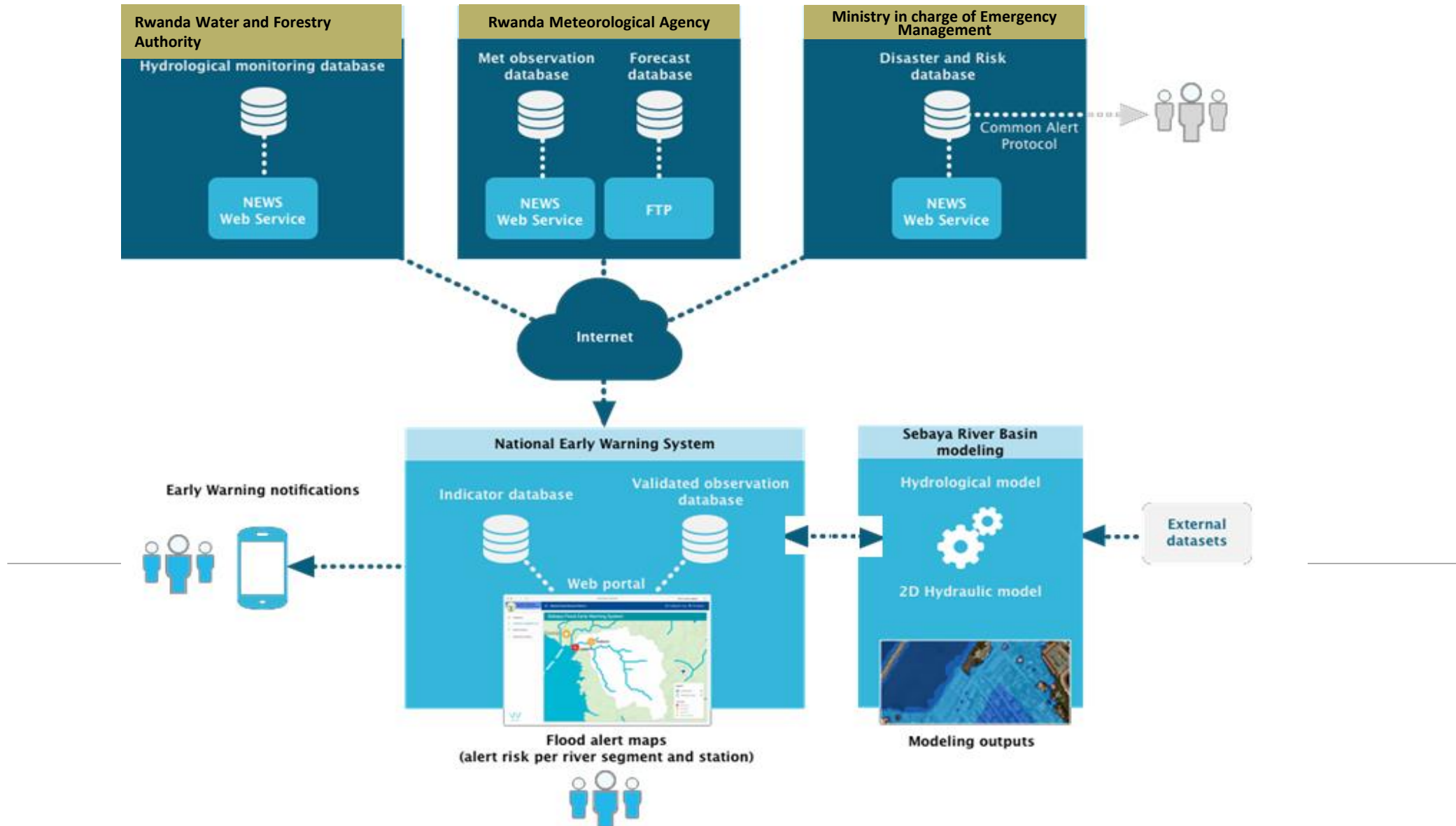


The Sebeya Flood Early Warning System (FEWS) is part of an assignment encompassing two components

Component 1 : developing and operationalizing a (generic) **NATIONAL EARLY WARNING PLATFORM** for **data sharing, analysis, visualization** and **triggering** the early warning of various hydrometeorological hazards

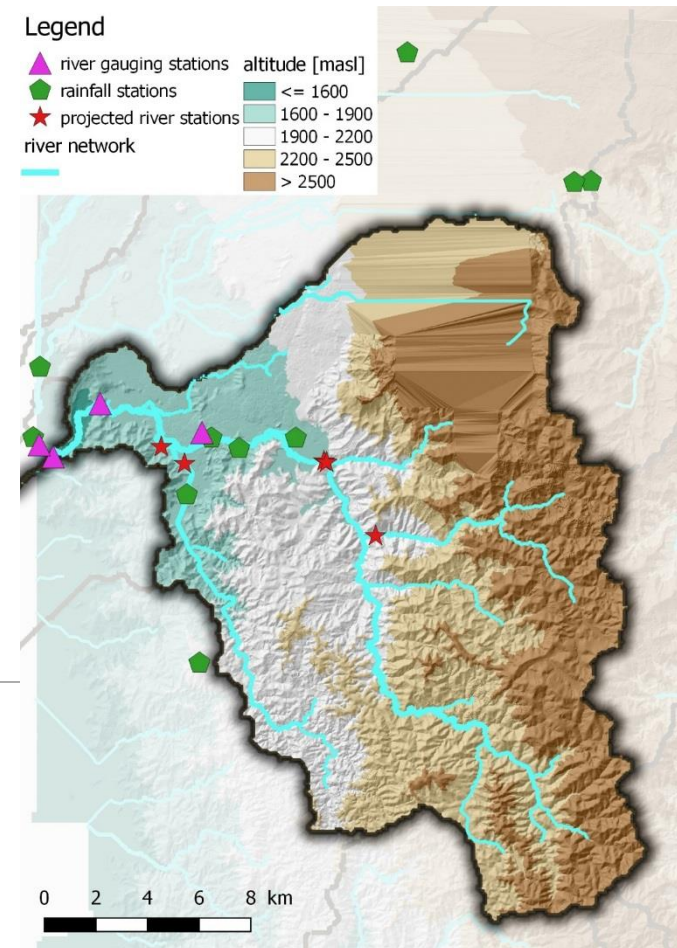
Component 2 : developing and operationalizing a (specific) **FLOOD EARLY WARNING SYSTEM FOR THE SEBEYA BASIN**, including an integrated hydrological and hydraulic flood forecasting model

CONTEXT: THE NEWS / FEWS FRAMEWORK

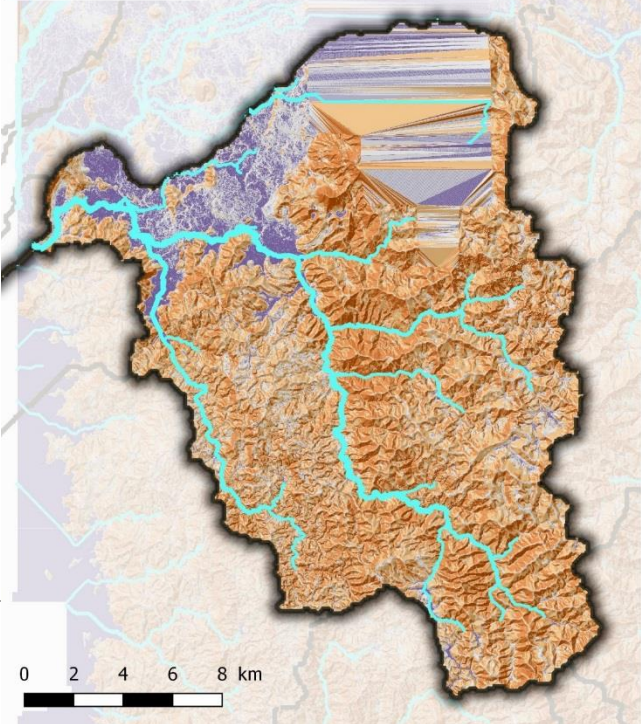
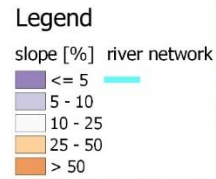


CONTEXT: THE SEBEYA CATCHMENT

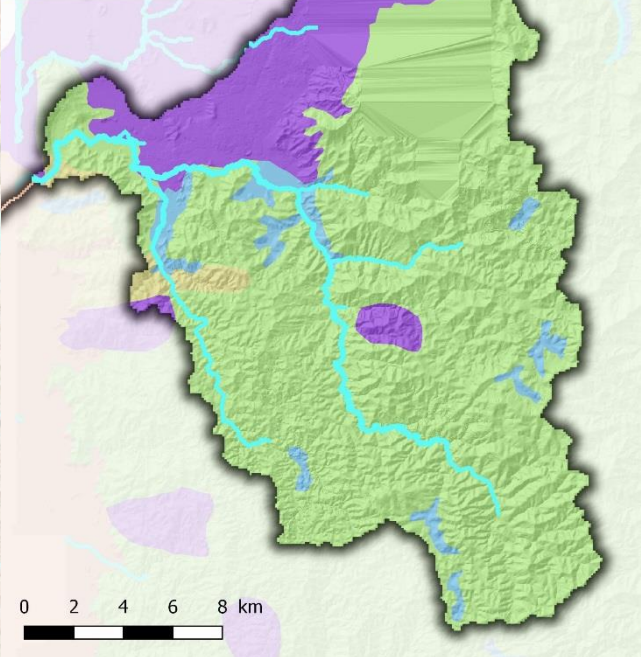
- Area = about 300 km²
- Main river = 30km long
- Elevation = ranging from 1450 to 3000 masl
- 3 main tributaries (from upstream to downstream)
 - Bihongore river
 - Karambo river
 - Pfunda river
- Flood prone areas located downstream (Mahoko, Rugerero)
- Flooding mechanisms = both from localized runoff and river overflowing



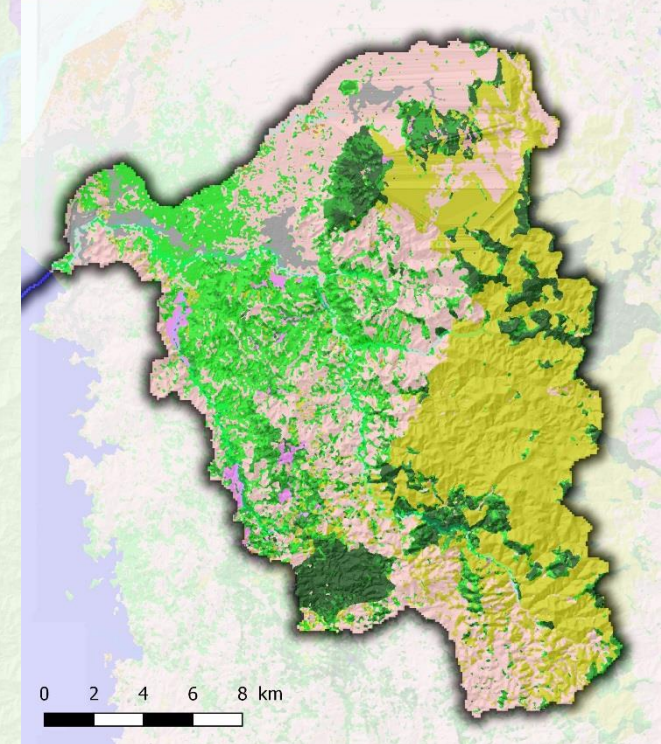
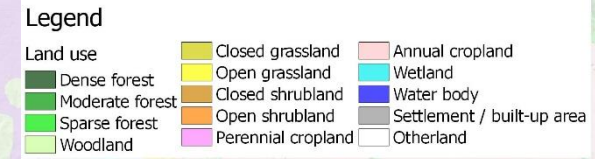
CONTEXT: THE SEBEYA CATCHMENT



Steep slopes
Highly contrasted pattern
between north and south



Highly contrasted geology
(and permeability)
between north and south



Contrasted land use
between upstream and
downstream

CONTEXT: THE MONITORING NETWORK

Existing network of observing stations

- Automatic weather stations (Meteo Rwanda)
- River gauging stations (RWFA)

➔ Ongoing initiatives to strengthen this network through the LAFREC

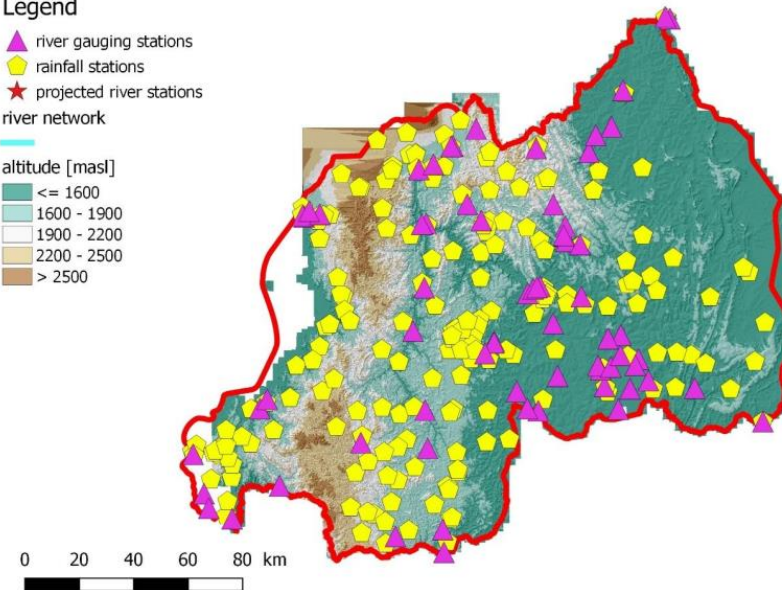


Legend

- ▲ river gauging stations
- rainfall stations
- ★ projected river stations
- river network

altitude [masl]

- <= 1600
- 1600 - 1900
- 1900 - 2200
- 2200 - 2500
- > 2500

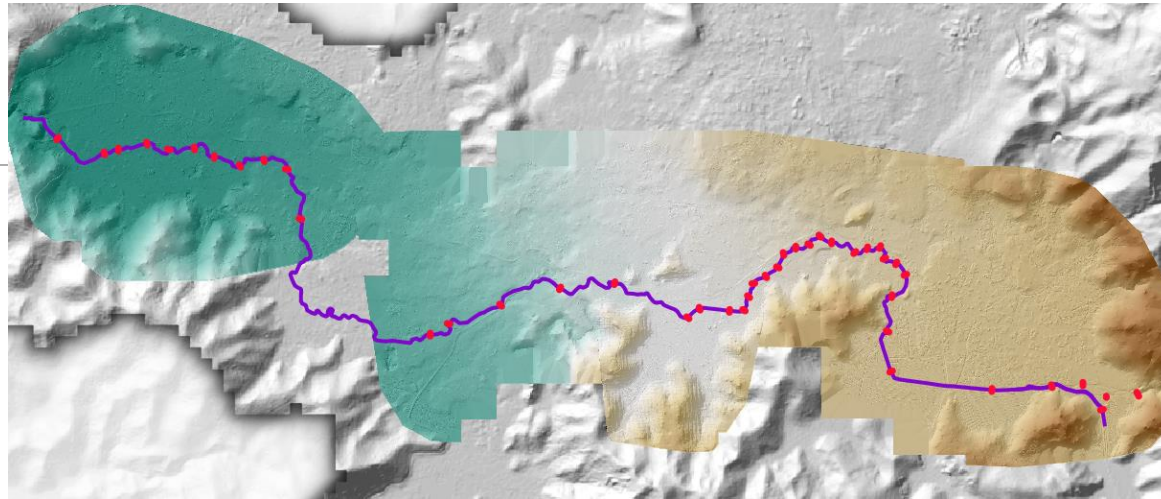


PROGRESS AND ACHIEVEMENTS: ITC

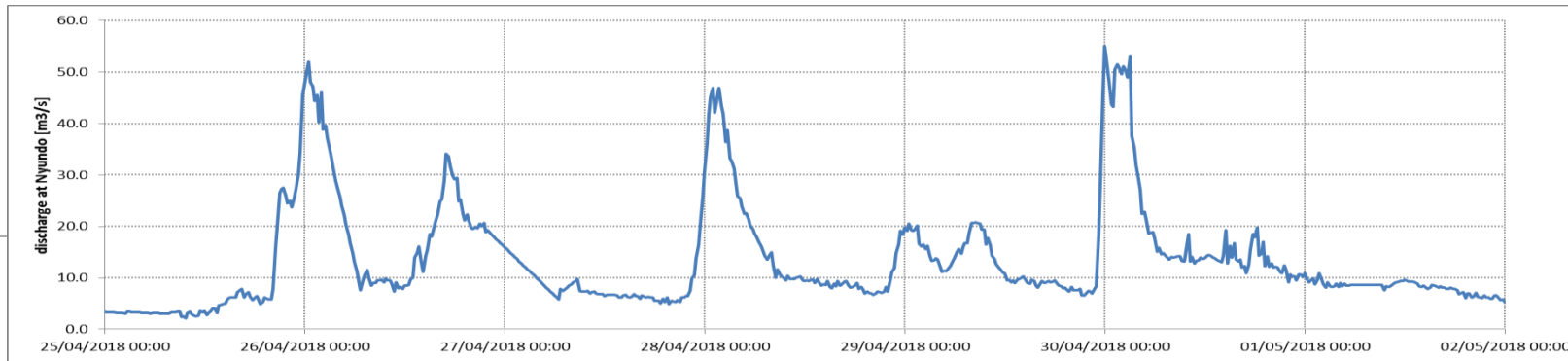
- Real-time connection with RWFA database operational
- Real-time connection with Meteo Rwanda gauging stations data under testing
- First version of the NEWS installed on the National Data Center



- Selection of the models to be used after consultation with RWFA
 - HEC-HMS for hydrological modelling → semi-distributed model
 - HEC-RAS for hydraulic modelling → 1D / 2D modelling
- Selection of the flood prone area to be modelled
 - Acquisition of a DEM of the floodplain
 - Definition of the topographic survey (cross sections and culverts / bridges) to be enforced by RWFA



- Strong orographic effects + very uneven and localized rainfall
➔ Difficult
- Catchment located behind the mountain which may prevent the rainfall radar to provide consistent estimates
- Very short lag time and time to peak ➔ need to rely on rainfall forecast to provide true early warning

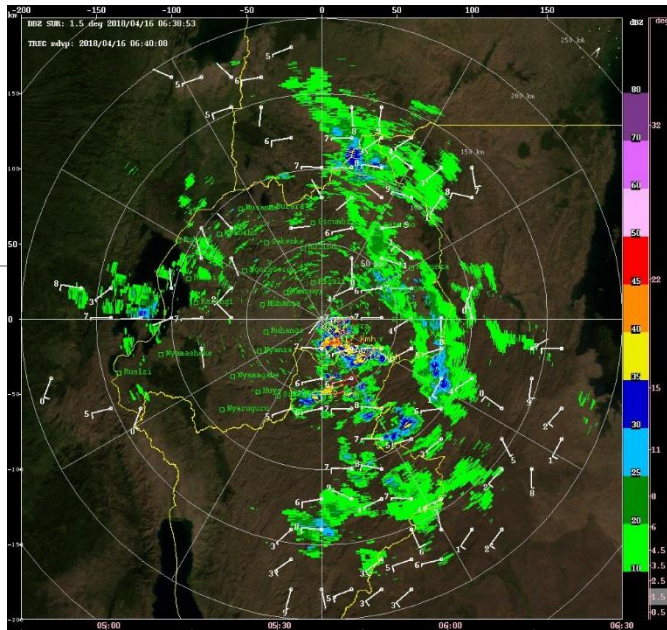


- Statistical flood discharges difficult to estimate given the short time series available
- Tricky model calibration with very parsimonious data

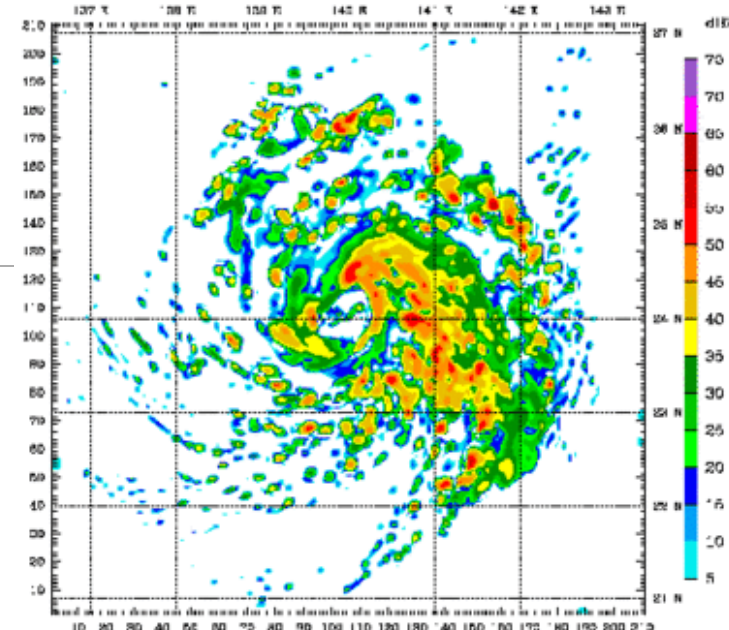
How to integrate and make the most of :

- The new rainfall and water level gauging stations
- The new rainfall observing and forecasting tools from Meteo Rwanda

Weather Radar



Weather Research and Forecasting model (WRF)



A certain number of issues still need to be addressed

- How will the NEWS and the FEWS be connected ?
 - How to set up the forecast workflow (frequency, lead time, latency, input data to be used) ?
 - Is it possible and relevant to produce flood maps in real-time or shall we use pre-computed maps ?
 - How to set up thresholds ?
 - How to deal with uncertainty ?
 - Which messages to issue (targeted audience, content, dissemination channel, lead time, etc.) ?
-
- How could and should risk awareness initiatives and contingency plans be adapted and or developed in the scope of the NEWS opportunity?
 - Who will operate and maintain the FEWS ?
 - How to account for the upcoming hydraulic works ?

Next steps provisional deadlines

- All data retrieved and displayed through the NEWS = mid April 2019
- Hydrological and hydraulic models developed and draft flood maps prepared = end of April 2019
- Hydrological and hydraulic models interfaced with the NEWS/FEWS = end of May 2019
- Alerts triggering and dissemination features implemented = mid June 2019
- Systems (NEWS and FEWS) fully installed = end of June 2019

THANK YOU FOR YOUR KIND ATTENTION
